FORM PTO-1390 (REV. 9-2001) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: 1175/66964

U.S. APPLICATION NO. (If known, see 37 CFR 1.5): 10/089291 Not yet known

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DK00/00558	October 5, 2000	October 7, 1999

TITLE OF INVENTION: WIND POWER PLANT

APPLICANT(S) FOR DO/EO/US: Lorenz Feddersen

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.
3. [ ] This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. [X] The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. [X] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. [X] is attached hereto (required only if not communicated by the International Bureau).
   b. [X] has been communicated by the International Bureau.
   c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [ ] An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. [ ] is attached hereto.
   b. [ ] has been previously submitted under 35 U.S.C. 154(d)(4).
7. [X] Amendments to the claims of the International Aplication under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. [X] are attached hereto (required only if not communicated by the International Bureau).
   b. [X] have been communicated by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [ ] have not been made and will not be made.
8. [ ] An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. [X] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] An English lanugage translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [X] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [X] A FIRST preliminary amendment.
14. [ ] A SECOND or SUBSEQUENT preliminary amendment.
15. [ ] A substitute specification.
16. [ ] A change of power of attorney and/or address letter.
17. [ ] A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. [ ] A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. [ ] A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. [X] Other items or information: Please see the attached sheet.

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
Not yet known	PCT/DK00/00558	1175/66964

21. [X] The following fees are submitted:	CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO $1040.00		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO $890.00		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO $740.00		
International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) $710.00		
International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) $100.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 890.00	
Surcharge of $130.00 for furnishing the oath or declaration later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$ 0.00	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	9 - 20 =	0	x $18.00	$ 0.00	
Independent claims	1 - 3 =	0	x $84.00	$ 0.00	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ $280.00	$ 0.00	
TOTAL OF ABOVE CALCULATIONS =				$ 890.00	
[ ] Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.			+	$	
SUBTOTAL =				$ 890.00	
Processing fee of $130.00 for furnishing the English translation later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				$ 0.00	
TOTAL NATIONAL FEE =				$ 890.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40.00 per property +				$ 40.00	
TOTAL FEES ENCLOSED =				$ 930.00	
				Amount to be refunded:	$
				charged:	$

a. [X] A check in the amount of $ 930.00 to cover the above fees is enclosed.

b. [ ] Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 03-3125. A duplicate copy of this sheet is enclosed.

d. [ ] Fees are to be charged to a credit card. WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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Donald S. Dowden
SIGNATURE

Donald S. Dowden
NAME

20,701
REGISTRATION NUMBER

PATENT
1175/66964

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Lorenz Feddersen
Serial No.	:	Not yet assigned
Filed	:	Herewith
For	:	WIND POWER PLANT
International Application No.	:	PCT/DK00/00558
Priority Date Claimed	:	October 7, 1999
Group	:	Unknown
Examiner	:	Unknown

1185 Avenue of the Americas
New York, New York 10036
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March 27, 2002

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231
BOX PCT

Sir:

Before examining the application identified above, please amend it as follows:

IN THE CLAIMS

Please amend the claims 6-9 as follows:

--6. (Amended) A wind power plant as claimed in claim 1, characterised in that the

rotor windings are dimensioned with a relatively low inductance.--

--7. (Amended) A wind power plant as claimed in claim 1, characterised in that the rotor is adapted to rotate at a relatively high speed of rotation, whereby the inductance can be further reduced..--

--8. (Amended) A wind power plant as claimed in claim 1, characterised in that the synchronous generator (3) is multipolar.--

--9. (Amended) A wind power plant as claimed in claim 1, where the wind turbine comprises a transformer with n output windings coupled in series with n rectifiers so as to obtain an HVDC.--

PATENT
1175/66964

REMARKS

Claims 6-9 are amended to conform to U.S. practice and reduce the filing fee.

Favorable action is respectfully requested.

Respectfully submitted,
COOPER & DUNHAM LLP

Donald S. Dowden
Reg. No. 20,701

DSD:jcr

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Claims 6-9 have been amended as follows:

--6. (Amended) A wind power plant as claimed in [one or more of the preceding claims] claim 1, characterised in that the rotor windings are dimensioned with a relatively low inductance.--

--5. (Amended) A wind power plant as claimed in [one or more of the preceding claims] claim 1, characterised in that the rotor is adapted to rotate at a relatively high speed of rotation, whereby the inductance can be further reduced..--

--8. (Amended) A wind power plant as claimed in [one or more of the preceding claims] claim 1, characterised in that the synchronous generator (3) is multipolar.--

--9. (Amended) A wind power plant as claimed in [one or more of the preceding claims] claim 1, where the wind turbine comprises a transformer with n output windings coupled in series with n rectifiers so as to obtain an HVDC.--

Title: Wind power plant

Technical Field

The invention relates to a wind power plant where the driving shaft communicates with a synchronous generator optionally through a gear, and where a transformer with n output windings communicates with an HVDC-transmission cable through an AC/DC-rectifier, measures being taken so as to secure against possible variations in the speed of rotation.

The use of a DC transmission cable implies that it is not necessary to take into account the capacitive load generated by the cable. In addition, it is possible to make the HVDC transmission cables longer than the AC transmission cables. These AC transmission cables must not exceed a so-called "critical length".

Background Art

WO97/45908 discloses a wind power park where each wind turbine is equipped with a synchronous generator. The output power of the synchronous generator is rectified by means of an AC/DC rectifier and transmitted through a DC transmission cable to a DC/AC inverter and a transformer so as to be transferred to the regional supply network. The AC/DC rectifier comprises controlled rectifiers, which are able to compensate for possible variations in the speed of rotation through a suitable control by means of particular control circuits. However, such control circuits are rather complicated.

WO 92/14298 and WO 99/007996 disclose a variable speed wind turbine comprising active power converters for providing AC power. These power converters include active controlled rectifiers and require expensive controller circuits.

Brief Description of the Invention.

The object of the invention is to provide a wind turbine plant where each wind turbine is able to tolerate sudden gusts and is of a more simple construction than hitherto known.

A wind turbine plant of the above type is according to the invention characterised by a magnetic field controller connected to the generator, said magnetic field controller being adapted to vary the magnetic field in the synchronous generator in response to a speed of rotation-depending output parameter of said synchronous generator in such a manner that possible variations in the speed of rotation are compensated for, whereby the AC/DC rectifier is composed of diodes. As a result, passive rectifier elements suffice in the rectifier. In addition, the controllable rectifiers and the associated control circuits are avoided which should otherwise be used for compensating for possible variations in the speed of rotation.

Moreover according to the invention the magnetic field controller may be adapted to detect the current generated by the synchronous generator, a negative feedback being established by means of the magnetic field controller for regulating the current through the rotor winding.

In addition, the magnetic field controller may according to the invention be adapted to detect the voltage generated by the synchronous generator, a negative feedback being established by means of said magnetic field controller.

Moreover, the magnetic field controller may according to the invention be adapted to detect the power generated by the synchronous generator, a negative feedback being established by means of said magnetic field controller.

Furthermore, the negative feedback may according to the invention include a P, I or D regulation, optionally a combination of said regulations.

Moreover, the rotor of the synchronous generator may according to the invention be dimensioned with a relatively low inductance. As a result, the time constant of the magnetic field controller can be reduced.

Moreover, the rotor may according to the invention be adapted to rotate at a relatively high speed of rotation. As a result it is possible to further reduce the inductance of said rotor.

When the generator furthermore is multipolar, it is possible to further reduce the inductance of the rotor.

Brief Description of the Drawings

The invention is explained in greater detail below with reference to the accompanying drawings, in which

Fig. 1 shows a wind power plant according to the invention comprising a synchronous generator and an AC/DC rectifier,

Fig. 2 illustrates a magnetic field controller for the synchronous generator of Fig. 1,

Fig. 3 shows a transformer connected to the synchronous generator,

Fig. 4 illustrates the entire plant, where the AC/DC rectifier has been shown in greater detail, and

Fig. 5 shows the voltage versus the speed of rotation at various magnetizing currents

to the synchronous generator.

Best Mode for Carrying Out the Invention

The wind power plant shown in Fig. 1 comprises a number of arms 1 secured to a hub communicating with a synchronous generator 3, optionally through a gear 2. The synchronous generator 3 is preferably a conventional three-phase synchronous generator with an energy supply to the rotor winding not involving a collector ring. The three-phase output of the synchronous generator 3 communicates with an AC/DC rectifier 7 through a possibly three-phase transformer 5. The AC/DC rectifier 7 delivers a DC voltage to a DC transmission cable 9. The most simple embodiment of the high-voltage rectifier 7 is formed by ordinary diodes coupled in series, and accordingly it is a passive rectifier. The series coupling of the diodes is established by means of several output windings on the output of the transformer 5. In this manner the voltage is reduced to all the diodes, and the harmonic flows in the generator/transformer are reduced. The three-phase transformer 5 can be designed as indicated in Fig. 3, where the primary side is connected to the generator output and comprises a star connection, and the secondary side is connected to the AC/DC rectifier 7 and can be composed of a Δ-connection and two combined Δ-star connections. The voltages generated by the secondary side of the transformer 5 are transferred to an AC/DC rectifier in form of a so-called B6 diode bridge, cf. Fig. 4. This B6 diode bridge comprises a total of eighteen rectifier elements, viz. six on each secondary winding, where each of the three phase conductors of each secondary winding is connected to the connection point of two rectifier elements coupled in the same direction, said three pairs of rectifier elements being coupled in parallel. The parallel coupling of the rectifier elements associated with each of the three secondary windings is subsequently coupled in series with the result that an HVDC-voltage is transmitted from the combined coupling of rectifier elements to an HVDC transmission cable 9. This transmission cable 9 can be several km long, such as 10 km. The use of such a DC transmission cable 9 instead of an AC cable is advantageous in the

length being arbitrary and almost unlimited. Thus it is not a question of a critical length as in connection with an AC cable. The end of the DC transmission cable 9 can be connected to a conventional DC/AC inverter converting into a mains frequency and be connected to the regional supply network optionally through a three-phase transformer. Measures have, of course, been taken to ensure that the alternating voltage generated by the DC/AC inverter 7 is in phase with the regional supply network.

A demand exists, of course, for a possibility of running the wind power plant at a speed of rotation depending on the wind speed. However, an increase of the speed of rotation implies that a high voltage is generated because the voltage is proportional to the speed of rotation, cf. the curves of Fig. 5. However, the output voltage is also proportional to the magnetic field in the generator 3, which can be utilized for stabilizing the voltage in case the speed of rotation is changed. The latter has according to the invention been obtained by means of a magnetic field controller 4 detecting an output parameter of the generator 3, such as the current and the voltage or the product thereof. This magnetic field controller 4 regulates the current supply to the rotor windings in the generator in response to the output parameter. As a result, a negative feedback is established with the result that when the output power is increased the current supply to the rotor winding 3a is reduced, whereby the system automatically seeks equilibrium. When the speed of rotation for instance is increased to 130% relative to an ordinary speed of rotation, the magnetizing current to the rotor winding 3a is reduced to 80%, cf. Fig. 5. When, on the contrary, the speed of rotation decreases to 80% relative to the ordinary speed of rotation, the magnetizing current to the rotor winding 3a is increased to 130%.

Fig. 2 shows an embodiment in greater detail of the magnetic field controller 4, and it appears that in two of the three phases of the generator the currents IG1, IG2 and the voltages UG1, UG2, respectively, are detected. These parameter values are multiplied in pairs to obtain an expression of the output power P_{gen}. This output

power P_{gen} is compared with a reference value P_{ref}, and the difference therebetween, viz. the error signal, is transferred to a regulation unit 11. In response to this error signal, the regulation unit generates a value for the magnetizing current I_m which is to be transferred to the rotor winding, optionally through a PWM 12 (Pulse Width Modulator) and an amplifying power transistor 13 controlling the supply of current to the rotor winding. The negative feedback is established by the detected power P_{gen} being deducted from the reference power P_{ref}. As a result a detected increased power P_{gen} implies that the error signal is reduced and that the power supplied to the rotor windings is reduced as well.

The power for the magnetizing of the generator 3 is typically of the magnitude 1% of the nominal power of the generator.

A portion of the magnetizing can optionally be provided by means of permanent magnets, where an electric magnetizing is then used for controlling the speed of rotation. The speed of rotation is downwardly limited by a maximum magnetizing current due to the limited thermal properties of the rotor windings and the magnetic structure of the generator, viz. the magnetic saturation. In order to extend the lower limit of the speed of rotation it is therefore advantageous when either the generator is provided with an additional output presenting an increased nominal output voltage or the transformer is provided with an input presenting a reduced nominal voltage. These additional inputs are only to be dimensioned for low power as the wind energy is low at a low speed of rotation.

According to a particularly advantageous embodiment, the wind turbine comprises a transformer with n output windings coupled in series with rectifiers so as to obtain an HVDC. The output windings can be coupled as a star or a Δ or as a combination thereof in order to obtain a sinusoidal input current.

Claims

1. A wind power plant where the driving shaft communicates with a synchronous generator (3) ~~optionally~~ through a gear (2) and with a transformer with n output windings, said transformer communicating through an AC/DC rectifier with an HVDC transmission cable (9), measures being taken so as to secure against possible variations in the speed of rotation, c h a r a c t e r i s e d by a magnetic field controller (4) connected to the generator (3), said magnetic field controller (4) being adapted to vary the magnetic field in the synchronous generator (3) in response to a speed of rotation-depending output parameter of said generator (3) in such a manner that possible variations in the speed of rotation are compensated for, whereby the AC/DC rectifier is composed of diodes. only

2. A wind power plant as claimed in claim 1, c h a r a c t e r i s e d in that the magnetic field controller (4) is adapted to detect the currents (IG1, IG2) generated by the synchronous generator (3), a negative feedback being established for regulating the current through the rotor winding (3a).

3. A wind power plant as claimed in claim 1, c h a r a c t e r i s e d in that the magnetic field controller (4) is adapted to detect the voltages (IG1, IG2) generated by the synchronous generator (3), a negative feedback being established for regulating the current through the rotor winding (3a).

4. A wind power plant as claimed in claim 1, c h a r a c t e r i s e d in that the magnetic field controller (4) is adapted to detect the power generated by the generator (3), a negative feedback being established for regulating the current through the rotor winding (3a) in response to the detected power.

5. A wind power plant as claimed in claim 4, c h a r a c t e r i s e d in that the negative feedback for regulating the current through the rotor windings (3a) includes a P, I or D regulation or a combination thereof.

6. A wind power plant as claimed in one or more of the preceding claims, c h a r - a c t e r i s e d in that the rotor windings are dimensioned with a relatively low inductance.

7. A wind power plant as claimed in one or more of the preceding claims, c h a r - a c t e r i s e d in that the rotor is adapted to rotate at a relatively high speed of rotation, whereby the inductance can be further reduced.

8. A wind power plant as claimed in one or more of the preceding claims, c h a r - a c t e r i s e d in that the synchronous generator (3) is multipolar.

9. A wind power plant as claimed in one or more of the preceding claims, where the wind turbine comprises a transformer with n output windings coupled in series with n rectifiers so as to obtain an HVDC.

Abstract

A wind power plant where the driving shaft communicates with a synchronous generator (3) optionally through a gear (2) and with a transformer, if any, communicating through an AC/DC inverter 7 with an HVDC transmission cable 9. The synchronous generator (3) is connected to a magnetic field controller (3). In response to an output parameter, such as the power generated by the synchronous generator (3), this magnetic field controller (4) is adapted to vary the magnetic field in the generator (3) in response to said output parameter. As a result it is possible to compensate for a possible variation in the output parameter, whereby said output parameter is stabilized. As a result it is possible to compensate for a varying speed of rotation.

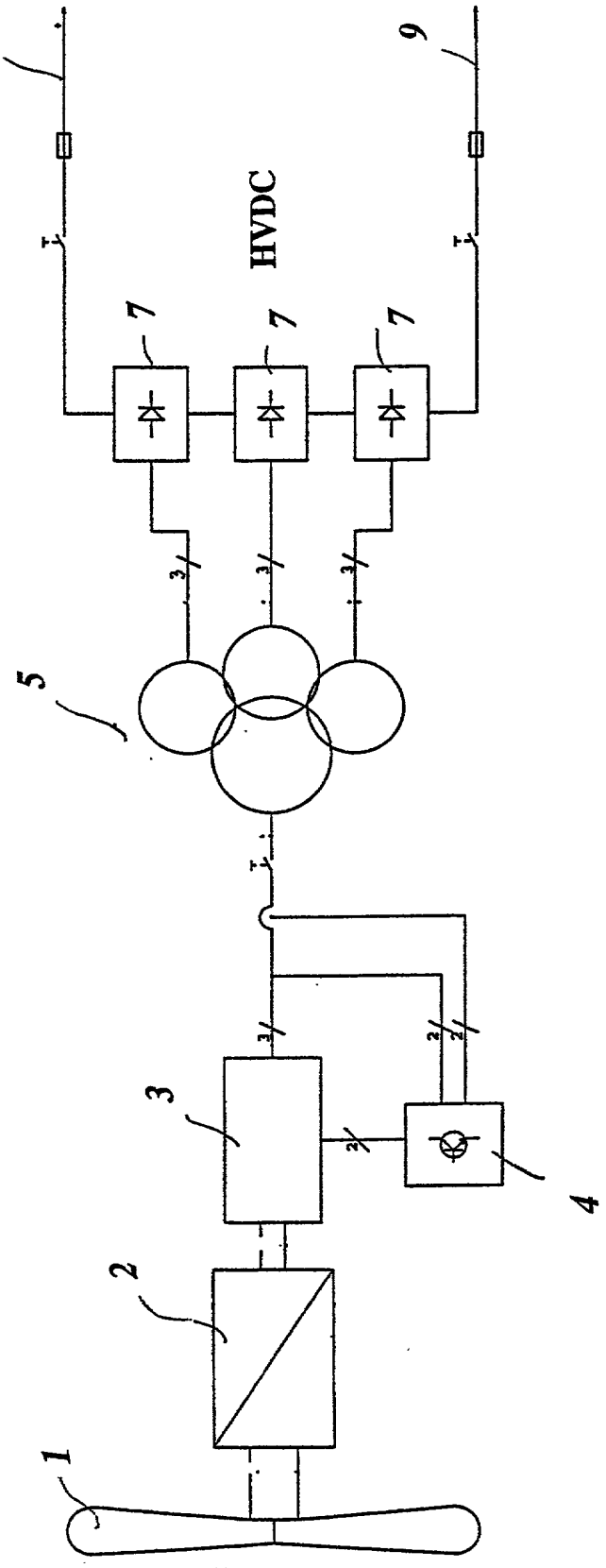


Fig 1

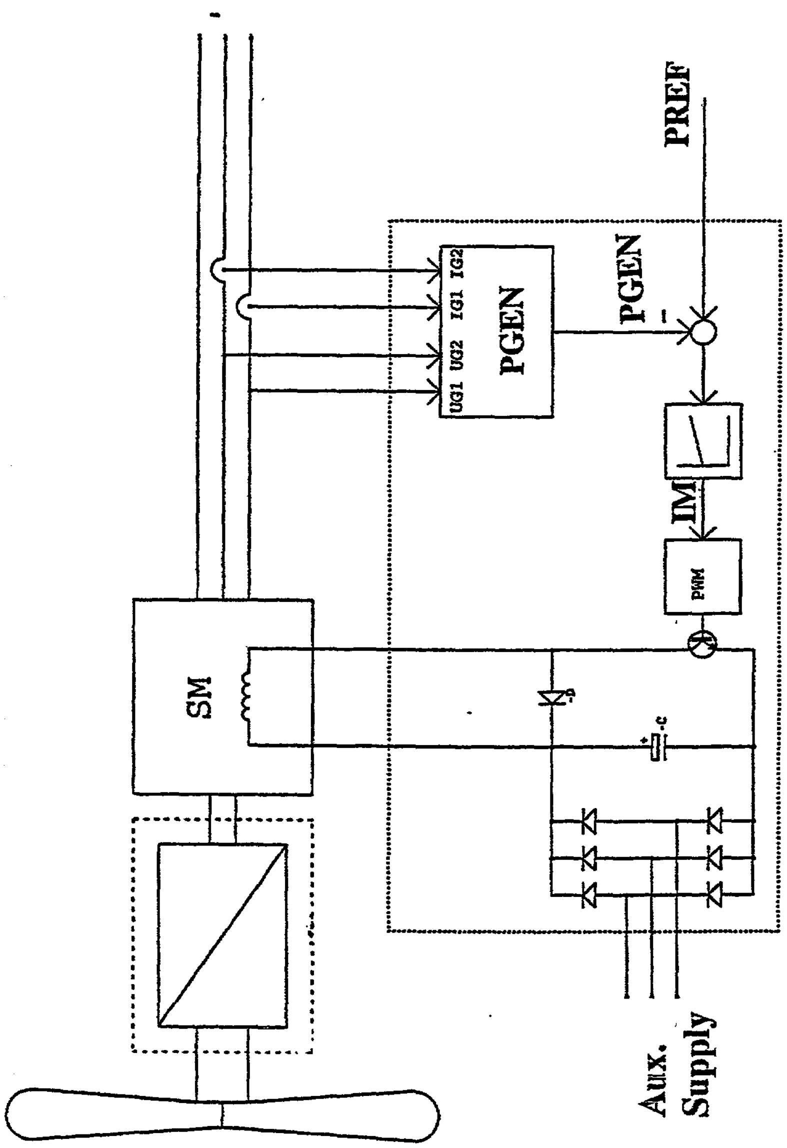
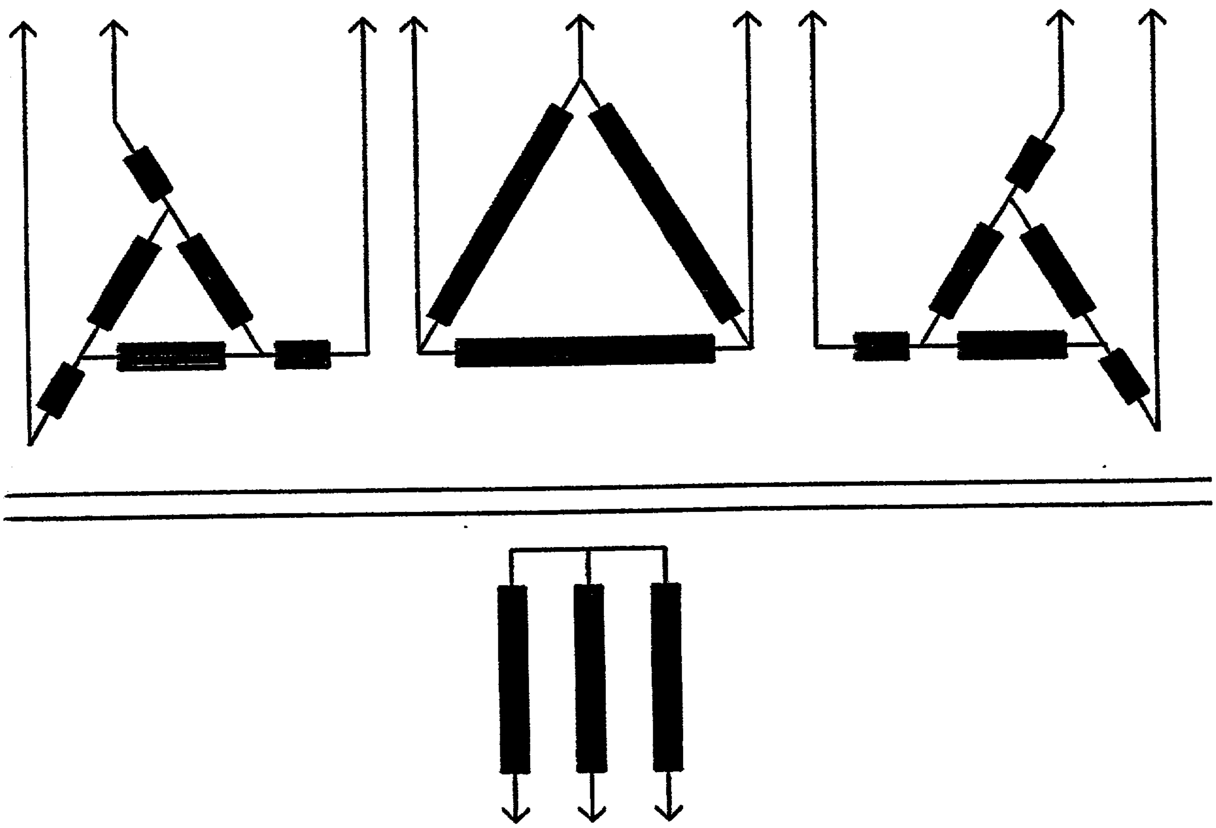


Fig 2

Fig 3



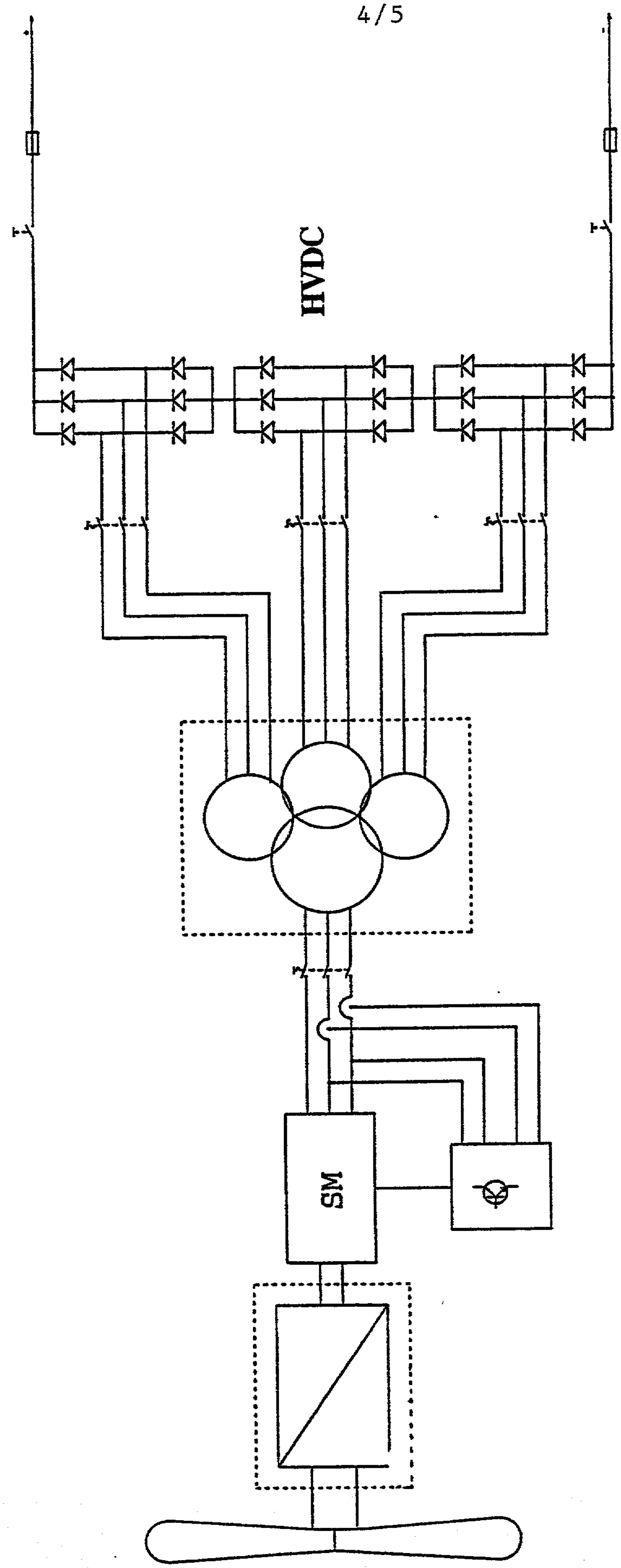
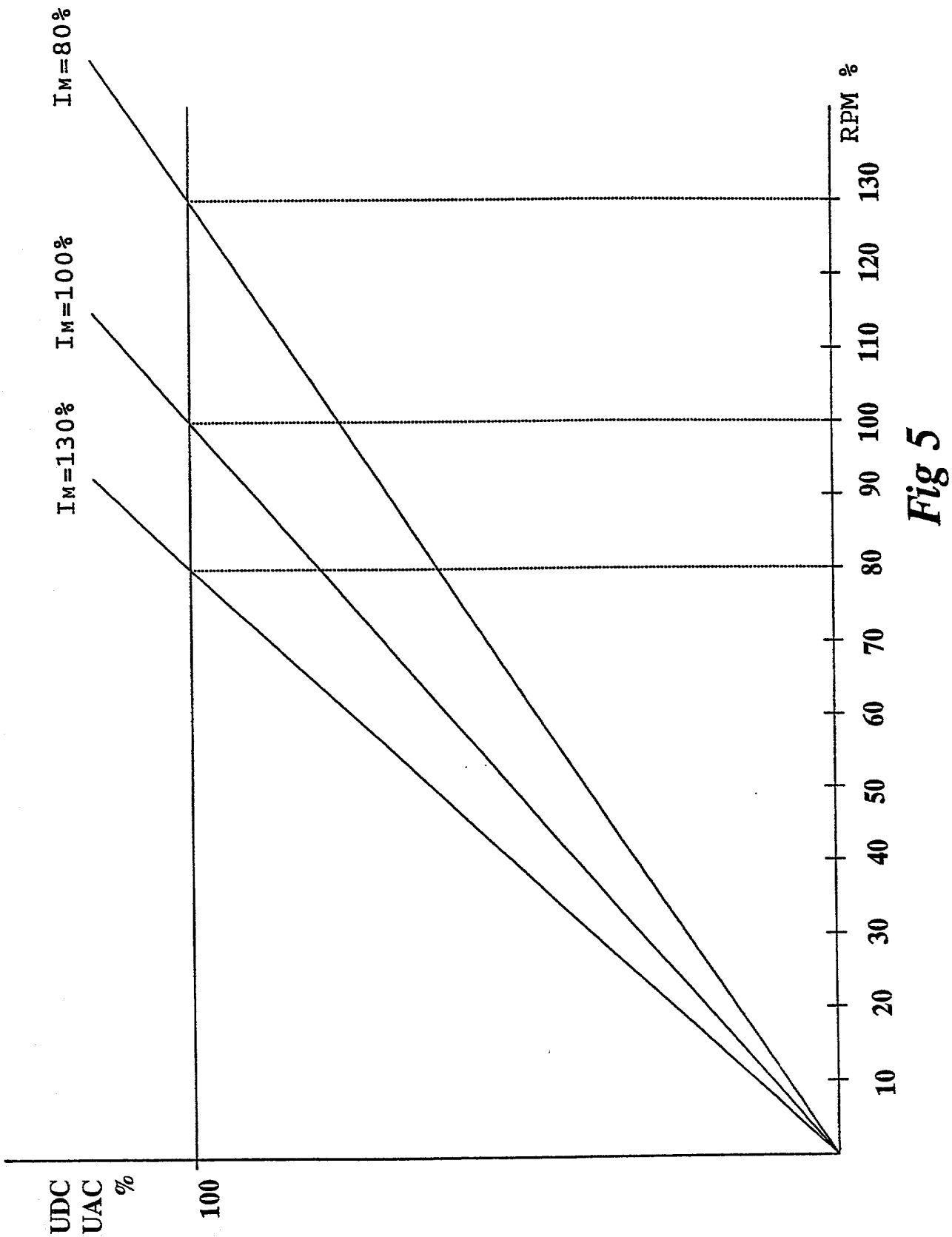


Fig 4


IM=80%
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UDC
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Fig 5

Residence ____

Post Office Address ______________________________________

____

Forms Index

COOPER & DUNHAM LLP

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Intellectual and Industrial Property Law including Patent, Trademark, Unfair Competition, Copyright and Antitrust Law. Trials.

Patent Application Declaration and Power of Attorney

As a below-named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:
Wind power plant (title)

the specification of which:
(check one)

____ *is attached hereto.*

x *was filed on*
5 October 2000 *as*

Application Serial No.
PCT/DK00/00558

and was amended _
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35 United States Code, Section 119 (a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International Application which designated at least one country other than the United States, listed below. I have also identified below any foreign application for patent or inventor's certificate, or PCT International Application having a filing date before that of the earliest application from which priority is claimed:

Prior Foreign Application(s)			***Priority Claimed***	
Number	***Country***	***Filing Date***	***Yes***	***No***
PA 1999 01436	DENMARK	7 October 1999	X	

Declaration and Power of Attorney

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below:

Provisional Application No.	*Filing Date*	*Status*

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States Application(s), or Section 365(c) of any PCT International Application (s) designating the United States listed below. Insofar as this application discloses and claims subject matter in addition to that disclosed in any such prior Application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56, which became available between the filing date(s) of such prior Application(s) and the national or PCT international filing date of this application:

Application Serial No.	*Filing Date*	*Status*

And I hereby appoint

John P. White (Reg. No. 28,678); Gerald W. Griffin (Reg. No.18,886); Norman H. Zivin (Reg. No. 25,385); Ivan S. Kavrukov (Reg. No. 25,161); Christopher C. Dunham (Reg. No. 22,031); Jay H. Maioli (Reg. No. 27,213); William E. Pelton (Reg. No. 25,702); Donald S. Dowden (Reg. No. 20,701); Robert D. Katz (Reg. No. 30,141); Peter J. Phillips (Reg. No. 29,691); Wendy E. Miller (Reg. No. 35,615); Richard S. Milner (Reg. No. 33,970); Albert Wai-Kit Chan (Reg. No. 36,479); Matthew B. Tropper (Reg. No. 37,457); Robert T. Maldonado (Reg. No. 38,232); Mary Anne P. Tanner (Reg. No. 40,197); Gerald M. Wissing (Reg. No. 36,309); George M. MacDonald (Reg. No. 39,284); and Mary Catherine DiNunzio (Reg. No. 37,306)

18

and each of them, all c/o Cooper & Dunham LLP, 1185 Avenue of the Americas, New York, New York 10036, my attorneys, each with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the patent, to transact all business in the Patent and Trademark Office connected therewith and to file any International Applications which are based thereon under the provisions of the Patent Cooperation Treaty.

Declaration and Power of Attorney

Please address all communications, and direct all telephone calls, regarding this application to:

_____ Reg. No._____

Cooper & Dunham LLP
1185 Avenue of the Americas
New York, New York 10036
Tel. (212) 278-0400

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, sunder section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first joint inventor FEDDERSEN, Lorenz 1-00

Inventor's signature Lars Feddersen

Citizenship DENMARK Date of 5 March 2002
signature_____

Residence Prof. Mensing Strasse 11, D-24937 Flensburg, GERMANY DEX

Post Office Address Prof. Mensing Strasse 11, D-24937 Flensburg, GERMANY

Full name of sole or first joint inventor_____

Inventor's signature_____

Citizenship_____ Date of signature_____

Residence_____

Post Office Address _____

Full name of sole or first joint inventor_____

Inventor's signature_____

Citizenship_____ Date of signature_____